

### **REMARKS**

The Office Action dated May 30, 2003 has been received and carefully studied.

The Examiner objects to the abstract because it contains two paragraphs. By the accompanying amendment, a new abstract has been provided that is limited to a single paragraph.

The Examiner also objects to the disclosure on page 9, line 20. By the accompanying amendment, the informality has been corrected.

The Examiner objects to claims 1 and 9 due to informalities. By the accompanying amendment, the informalities have been corrected.

The Examiner rejects claims 1-4 and 9-10 under 35 U.S.C. §102(b) as being anticipated by Mueller et al., U.S. Patent No. 5,993,189.

The rejection is respectfully traversed.

Mueller et al. disclose apparatus for molding microsystem structures that compensates for variations in thickness of molding tools and materials. A closable chamber is formed by a pair of oppositely lying chamber parts, one of which is fixed to framework and the other adjustably guided in a frame. The Examiner states that Mueller et al. teach a movable vacuum forming apparatus having a pair of frames 19 and 23 provided to respective upper and lower press plates of a press via seals for surrounding a predetermined space, and an interpenetrated portion 23 provided at one of the frames and capable of being interpenetrated into other of the frames movably in an up and down direction.

However, Mueller et al. do not disclose or suggest seal apparatus that seals the interval by compensating for strain of the interpenetrated portion caused by the negative pressure in the space as recited in the instant claims. Specifically, the present invention relates to a movable vacuum forming apparatus, and thus the frames are not secured on the plates, they are just in contact with the plates

via the packing 20, 21. Consequently, the frames are rather weak compared to the frames secured on the plates in Mueller and are therefore sensitive to the strain caused by atmospheric pressure. To handle this, the present invention employs seal apparatus that seals the interval between the interpenetrated portion and the frame and compensates for the strain of the interpenetrated portion. This feature is expressly recited in claim 1 (as well as the other independent claims by virtue of the accompanying amendment).

In contrast, although the square ring 25 of Mueller can seal the vacuum space, it is not made to compensate for any strain of the interpenetrated portion and seal the additional interval resulting from such strain. The packing in Mueller et al. is simply a typical square ring, whereas the packing of the present invention (Figure 3) is designed having a special shape and including a lip 24 that maintains contact with the frame 6 even when the clearance G is enlarged due to strain or deformation of the interpenetrated portion 11. This is nowhere disclosed or suggested by the cited reference.

The Examiner rejects claims 5, 7 and 11 under 35 U.S.C. §103(a) as being unpatentable over Mueller et al. in view of Hudkins et al. The Examiner admits that Mueller et al. fail to teach the suction apparatus vacuums the surrounded space via the uninterpenetrated portion, and fail to disclose a base provided at a lower press plate via a seal and having an interpenetrated portion capable of being interpenetrated to the one frame movably in an up and down direction. The Examiner cites Hudkins et al. as teaching these elements, and concludes that it would have been obvious to have modified the device of Mueller et al. with the suction apparatus of Hudkins for vacuuming the surrounding space via the uninterpenetrated portion and a base upon the press plate replacing a frame, in order to reduce the number of components.

Claims 5, 7 and 11 are believed to be allowable by virtue of their dependence, for the reasons set forth above.

The Examiner rejects claims 7-8 and 11 under 35 U.S.C. §103(a) as being unpatentable over Mueller et al. in view of Cassani et al. The Examiner admits that Mueller et al. fail to teach a base provided at a lower press plate via a seal and having an interpenetrated portion capable of being interpenetrated to the one frame movably in an up and down direction, and fail to disclose a base having a pressure balance hole for communicating the surrounded space and the space formed between the base and the lower press plate. The Examiner cites Cassani as teaching these elements, and concludes that it would have been obvious to modify the apparatus of Mueller with the Cassani base and pressure balance hole in order to control the pressure applied during molding.

Claims 7-8 and 11 are believed to be allowable by virtue of their dependence, for the reasons set forth above.

The Examiner also rejects claims 6-7 and 11 under 35 U.S.C. §103(a) as being unpatentable over Mueller et al. in view of Schubart. The Examiner admits that Mueller et al. fail to teach a base provided at a lower press plate via a seal and having an interpenetrated portion capable of being interpenetrated to the one frame movably in an up and down direction, and fail to disclose a hole provided at one of the frames and connected to the suction apparatus, a first notched groove formed at an upper face of one of the frames and communicating with the hole, and a second notched groove formed at an upper face of the interpenetrated portion and communicating with the first notched groove. The Examiner cites Schubart as teaching these elements, and concludes that it would have been obvious to modify the apparatus of Mueller with these elements to reduce the number of components.


Claims 6-7 and 11 are believed to be allowable by virtue of their dependence, for the reasons set forth above.

The remaining prior art is believed to have been properly not relied upon in rejecting any

claim.

Reconsideration and allowance are respectfully requested in view of the foregoing.

Respectfully submitted,



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**Amendments to the Specification:**

Please replace the fourth full paragraph on page 9 with the following amended paragraph:

According to the above-described constitution, the upper frame 6 and the lower frame 7 are made of metal and are movable in the up and down direction in the range of the movable amount  $h$  and therefore, can follow a change in the height of the work  $W$ . The movable range can be made an arbitrary magnitude by changing the height of the interpenetrated portion 11 or the height of the upper frame 6 and by previously estimating the necessary movable range in correspondence with the change in the height, there is achieved an effect ~~[[of]]~~ capable of dealing with the change of the height of the work  $W$  without replacing the upper frame 6 and the lower frame 7.

## Abstract

The object of the invention is to provide a chamber for a heating press which can cope well with the height change of a composite material article. In a chamber for a heating press, upper and lower metal flanges 6, 7 are provided between upper and lower press heating plates 1, 2 and an intrusion part 11 is further formed in the lower metal flange. This intrusion part 11 is intruded into the upper metal flange 6 and the gap between the intrusion part 11 and the upper metal flange 6 is sealed by packing 22 having a lip.



Listing of Claims

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1. (Currently amended) A movable vacuum forming apparatus comprising: a pair of frames provided respectively to ~~respective~~s of upper and lower press plates of a press apparatus via seals for surrounding a predetermined space; an interpenetrated portion provided at one of the frames and capable of being interpenetrated into other of the frames movably in an up and down direction; a seal apparatus for slidably sealing an interval between the interpenetrated portion and the other of the frames; and a sucking apparatus for bringing a space surrounded by the interpenetrated portion and the other of the frames under a negative pressure, wherein the seal apparatus seals the interval by compensating for a strain of the interpenetrated portion caused by the negative pressure of the space.
2. (Original) The movable vacuum forming apparatus according to claim 1, wherein; the seal apparatus is a packing mounted to the interpenetrated portion for being brought into sliding contact with an inner periphery of the other of the frames and includes a lip having a size in correspondence with the strain of the interpenetrated portion.
3. (Original) The movable vacuum forming apparatus according to claim 1, wherein; the seal apparatus is a packing mounted to the other of the frames and brought into sliding contact with

an outer periphery of the interpenetrated portion and includes a lip having a size in correspondence with the strain of the interpenetrated portion.

4. (Original) The movable vacuum forming apparatus according to claim 1, further comprising a connecting piece for connecting the pair of frames movably in the up and down direction by a predetermined length to thereby integrate the pair of frames.

5. (Original) The movable vacuum forming apparatus according to claim 1, wherein; the other of the frames provided with the interpenetrated portion includes an uninterpenetrated portion which is not interpenetrated into the one of the frames and the suction apparatus vacuums the surrounded space via the uninterpenetrated portion.

6. (Original) The movable vacuum forming apparatus according to claim 1, further comprising: a hole provided at the one of the frames and connected to the suction apparatus; a first notched groove formed at an upper face of the one of the frames and communicated with the hole; and a second notched groove formed at an upper face of the interpenetrated portion and communicated with the first notched groove, wherein the suction apparatus vacuums the surrounded space via the first notched groove and the second notched groove.

7. (Currently amended) A movable vacuum forming apparatus



comprising: one frame provided between upper and lower press plates of a press apparatus for surrounding a predetermined space provided at the upper press plate via a seal; a base provided at the lower press plate via a seal and having an interpenetrated portion capable of being interpenetrated to the one frame movably in an up and down direction; a seal apparatus for slidably sealing an interval between the interpenetrated portion of the base and the one frame; and a suction apparatus for bringing a space formed by the interpenetrated portion and the one frame and the upper and the lower press plates under a negative pressure, wherein the seal apparatus seals the interval by compensating for strain of the interpenetrated portion caused by the negative pressure of the space.

8. (Original) The movable vacuum forming apparatus according to claim 7, wherein; the base includes a pressure balance hole for communicating the surrounded space and the space formed between the base and the lower press plate.

9. (Currently amended) A vacuum press apparatus comprising: upper and lower press plates moved in an up and down direction by a predetermined drive apparatus; one frame attachably and detachably provided between the upper and the lower press plates for surrounding a predetermined space provided at one of the upper and the lower press plates via a seal; a member provided between the upper and the lower press plates, provided at other of the upper and the lower press plates via a seal and having an

interpenetrated portion capable of being interpenetrated to the one frame movably in the up and down direction; and a seal apparatus for slidably sealing an interval between the interpenetrated portion of the member and the one frame; and a suction apparatus for bringing a space surrounded by the interpenetrated portion and the one frame under a negative pressure, wherein the seal apparatus seals the interval by compensating for strain of the interpenetrated portion caused by the negative pressure of the space.

10. (Original) The vacuum press apparatus according to claim 9, wherein the member is a frame.

11. (Original) The vacuum press apparatus according to claim 9, wherein the member is a base.